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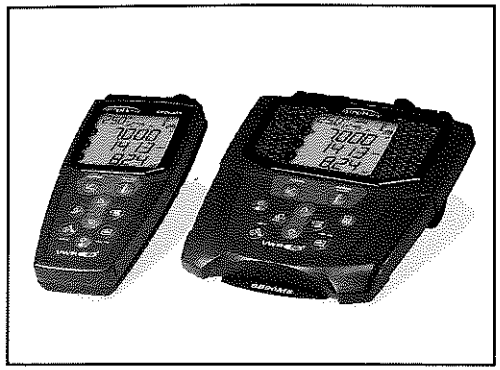
254503-001 Rev.A

VWR

# VWR sympHony Meter Abridged User's Guide



sympHony™

# Table of Contents

## Chapter I
# Introduction

This user guide has been abridged to include the most pertinent details. To download the extended user guide, visit our website at www.vwr.com.

Congratulations! You have selected a VWR sympHony meter designed for electrochemistry measurement in the field or in the laboratory.

- Single parameter meters provide single measurement of pH, dissolved oxygen, or conductivity.
- Dual parameter meters provide dual measurements of pH/dissolved oxygen, pH/conductivity, or pH/ISE (ion selective electrode).
- Multiple parameter meters provide multiple measurements of pH, ISE, dissolved oxygen, and conductivity.

Built to meet the demands of busy, multi-user laboratories or plant environments, all meters are microprocessor controlled aiding in the delivery of accurate and precise measurements. The waterproof portable meters can even withstand submersion for short periods of time without any negative effect on operation. To better meet the needs of users in environmental protection and control, food and beverage, pharmaceutical, and consumer product laboratories, the sympHony meters include these key features:

- **Password Protected Methods** – Meter's memory will save up to ten custom measurements and calibrations for future reference. Password protection of each method eliminates any tampering with methods as multiple users access only the procedure most appropriate to their work.
- **AUTO-READ™** – The instrument starts a measurement and automatically prints or logs data when the reading becomes stable.

- **Stirrer Control** – Benchtop meters have a stirrer control for the Stirrer Probe and the AUTO-STIR™ BOD probe, eliminating the need for additional stir plates and stir bars.

An easy-to-use reference guide, attached to each meter, supports daily use.

Please read this manual thoroughly before using your benchtop or portable meter. Any use outside of these instructions could invalidate your warranty and/or cause permanent damage to the meter.

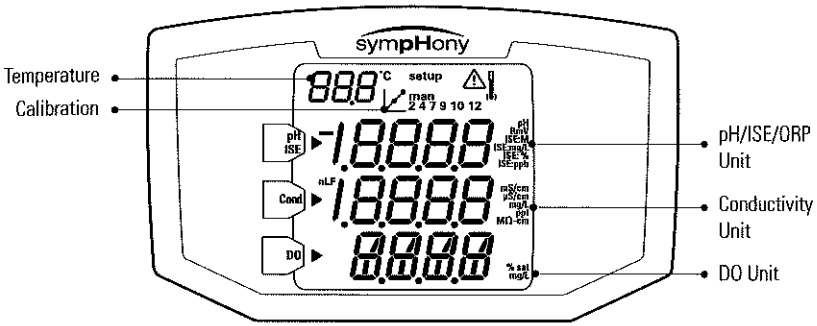


# Chapter II
# Display

## General Description

Throughout a given process, the LCD on any sympHony meter provides **Temperature** and **Calibration** data. The **setup** only appears when the meter is in setup mode. The ⚠ indicates an error condition; when displayed with the 🌡, a sensor quality issue exists.

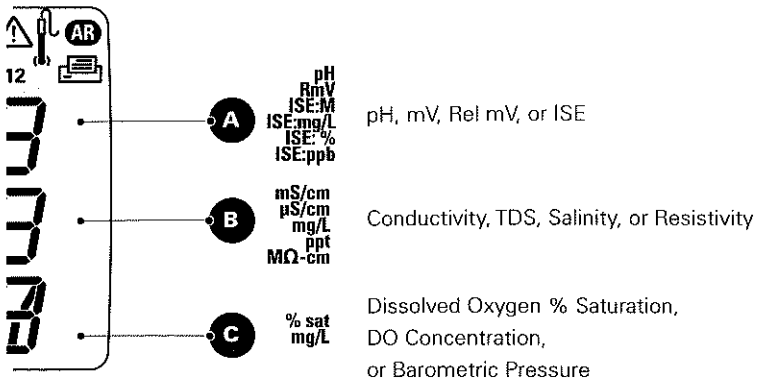
AR will be discussed in greater detail in **Chapter V, Menu Setup**.




**Multi-Parameter Meter**

Depicted here is the primary LCD of the sympHony meter capable of multi-parameter measurement.

***Note:*** *the lowest 3 lines of data correspond to what is being measured.* ▲




pH, mV, Rel mV, or ISE

Conductivity, TDS, Salinity, or Resistivity

Dissolved Oxygen % Saturation,
DO Concentration,
or Barometric Pressure

Units of measure, displayed on the right side of the screen, will flash until the reading is stable.

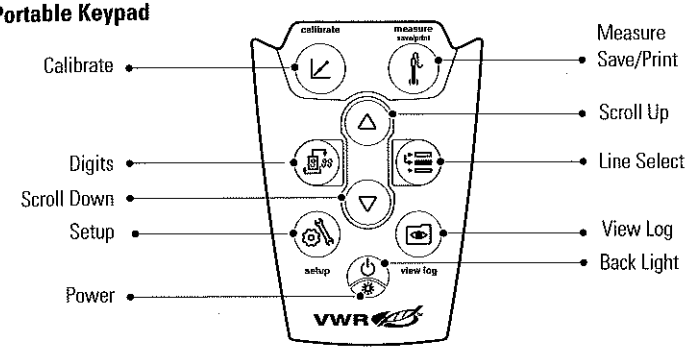


# Chapter III
# Keypad

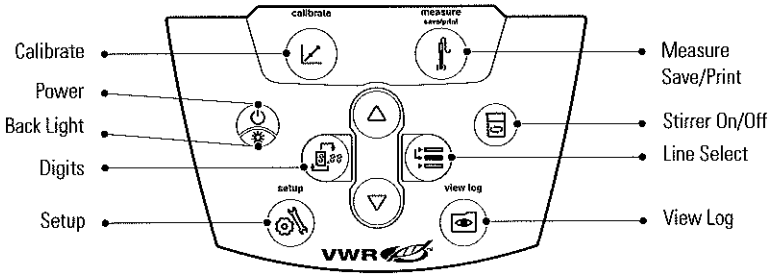
## General Description

Keypad layout is the same for all sympHony meters. The portable meters have 9 keys. The benchtop meters have 10 keys due to the addition of a button.

### Portable Keypad




### Benchtop Keypad



The center area of the ergonomically designed keypad is the focal point for setting up and navigating the meter. In particular,  and  /  are used frequently to change LCD views.

**Convenience features include:**

- **Display Backlight** – A quick press of  will turn the backlight on and off. When the meter is operating on battery power, the backlight will automatically turn off after two minutes to conserve power. When batteries are low, the backlight will no longer turn on.

- **Automatic Shut-off** – All sympHony meters will shut down after 20 minutes without a keypress. This maximizes battery power on portable meters, or benchtop meters being run on battery power.

- **Audible Signals** – The meter will beep whenever a key is pressed providing immediate verification that the user's input was received.

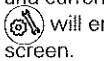
- **Visual Alarm Signals** – Flashing  and  indicate calibration settings need adjustment. For more detail, refer to subsequent sections of this manual discussing specific measurement techniques.

To become familiar with each function, please review these icon definitions.





## Icon Definitions

| Key | Description | Key | Description |
|---|---|---|---|
|  | • Turns meter on, if shut off.<br>• Toggles backlight on and off, if meter is on.<br>• If meter is on, holding down  will turn off the meter. |  <br>  | • Changes measurement mode of the selected line.<br>• Changes selected line in setup, methods and log view modes.<br>• Edits the value of the flashing digit for setup, password entry, and calibration modes. |
|  | Switches arrow on left of the screen between 3 display lines to select and edit. |  | Changes selected digit to edit and moves decimal point when changing values in setup, password entry, and calibration. |
|  | Starts calibration for currently selected line in measurement mode.<br>• If arrow is pointed to the top line and the current units are pH,  will start a pH calibration.<br>• Each time  is pressed in the calibration it will accept the current point value and move to the next cal point until the max # of cal pts are performed, then it will return to measurement mode. |  | • Prints and logs a measurement in continuous or timed measurement modes.<br>• Prints, logs, and freezes screen when the reading becomes stable in AUTO-READ™ mode.<br>• Exits setup menu and returns to measurement mode.<br>• Accepts calibration and returns to measurement mode. |
|  | Enters setup menu starting with selected line in measurement mode:<br>If arrow is pointed to top line and current units are ISE, then  will enter the ISE setup screen. |  | Enters log view and download screens. |
| | |  | Turns stirrer on and off. |

## NOTES



Chapter IV

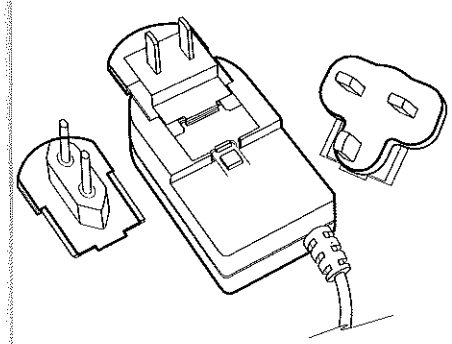
# Preparation

## Installing Power Adapter

The universal power supply that is included with your benchtop meter is the ONLY power supply source recommended for use with this unit. Use of any other power supply will void your meter warranty.

The external electrical power supply is rated to be operated at 100-240 VAC, 0.5 A, 50/60 Hz.

Based on your power source, select one of the four plugs provided – 110 V, 220 V, 240V – and slide it into the grooves on the adapter. A click will be heard when the plug is properly in place.



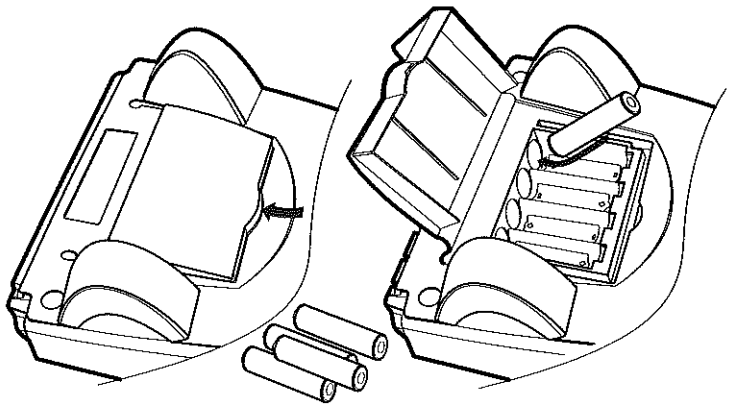
Connect the output plug of the power supply to the power receptacle on the benchtop meter. Refer to the diagram in section **Connecting the Electrodes**.

## Installing Batteries

The sympHony meters use four AA Alkaline batteries. Do not use lithium or rechargeable batteries. Improper installation of non-alkaline batteries could create a hazard.

***Note:*** ***For benchtop meters*** *— installation of batteries is not required if the unit will always be connected to a power source via the universal power supply.* ▲

1. Confirm meter is off.
2. Gently place meter upside down on a clean, lint-free cloth to prevent scratching of LCD.
3. Remove the battery case cover.
4. Insert new batteries with the "+" pole oriented as depicted in the battery compartment housing.
5. Replace the cover.



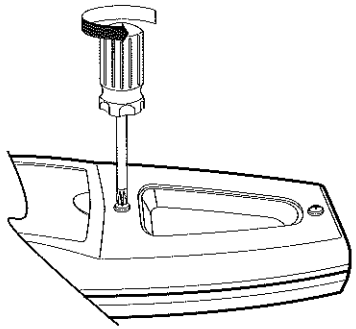


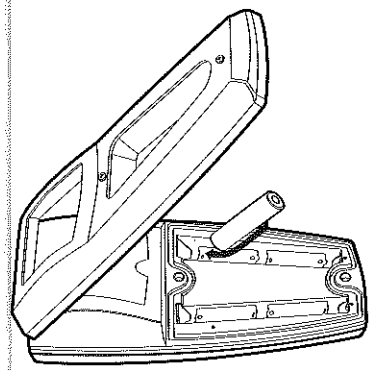


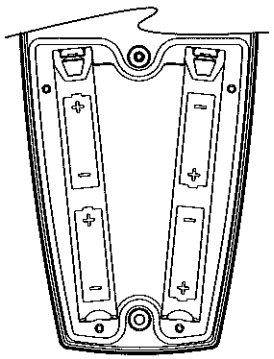
6. Stored data, calibrations and methods will remain in the meter's nonvolatile memory when batteries are being replaced, however, date and time may need to be reset.

***Note:*** ***For portable meters*** *— Batteries are supplied and installed from the factory.* ▲

To access the battery compartment in portable meters, loosen the two screws in the center back of the meter. Note these are captive screws that cannot be completely removed.



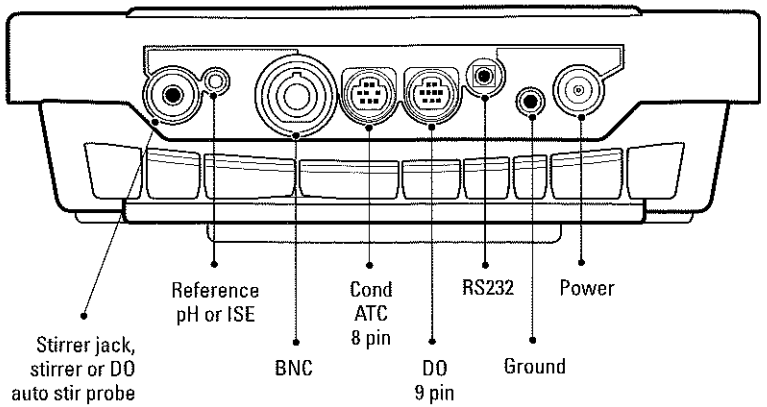




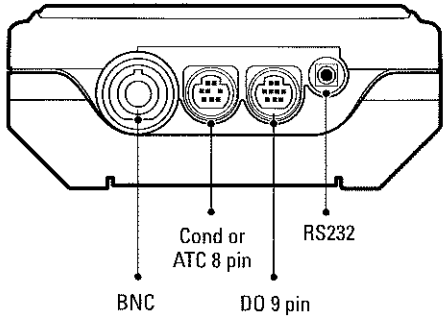
## Connecting the Electrodes

Follow the diagrams below to correctly connect electrodes and probes to the meter. The multi-parameter meter is depicted; dual and single parameter meters will have fewer connections.

### Benchtop Meter – Electrode Connections




### Portable Meter – Electrode Connections








**Some connections serve multiple uses, for example:**

- Use the BNC input to connect pH, ISE and ORP combination and sensing electrodes with a waterproof BNC connector.
- Benchtop meters have a pin tip input for a separate reference electrode. These require an appropriate BNC sensing electrode for measurement.
- The 970899WP dissolved oxygen probe can be used with the BNC connector.
- Use the waterproof 8 pin MiniDIN connector for conductivity probes.
- The waterproof 8 pin MiniDIN connector is also used for automatic temperature compensation (ATC) probes.
- The DO AUTO-STIR™ probe uses the waterproof 9 pin MiniDIN connector and the stirrer jack for the smaller connector.

## Turning On the Instrument

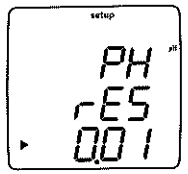
With the batteries installed in the portable meters, or either the batteries installed o line power attached to the benchtop meter, press the ⏻ to turn on the instrumen A quick press of the ⏻ after the meter has powered up will toggle the backlight o and off. When the benchtop meter is drawing line power, the backlight will stay on until turned off with the ⏻. To turn off the meter press and hold the ⏻ for 3 seconds.

# Chapter V
# Menu Setup

**Navigation Tips**


- The ⚙ enters the setup mode.

- Main menu items are shown in the top line of the LCD. To scroll through the menu, press △/▽. Text that will appear in the LCD is represented in the **Display** column of the tables on following pages.




- Use ☰ to select top, middle or bottom line.
- Use △/▽ in combination with ⚙ to edit the values in selected line.
- Use ☰ to accept changes and return the arrow icon to the top line.
- Use ⏻ to save changes and return to the measurement mode.

## General Menu Settings

The following table describes general instrument setup.

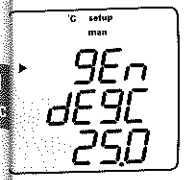
| Description | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| Manual Temperature Compensation Setting | gEn<br>dEgC<br>25.0 | **-5.0 - 105** | **25.0** | Yes |
| Stirrer Speed Setting (Benchtop only) | gEn<br>Stlr<br>4 | **OFF, 1, 2, 3, 4, 5, 6, 7** | **4** | Yes |
| Auto-Shut Off Selection | gEn<br>AUtO<br>On | **OFF, On** | **On** | No |

- **Manual Temperature** setting controls temperature compensation when no temperature sensors are attached to the instrument.
- **Stirrer Speed Setting** (benchtop meters only) sets the speed from 1 through 7 with speed 1 being the slowest and 7 being the fastest. A speed of 3 or 4 is recommended for most applications.
- **Auto-Shut Off** controls whether the instrument will automatically turn off the instrument after 20 minutes elapse without a key press. To disable this feature, select OFF and the instrument will continue to operate.





**To access these settings:**




1. In the measurement mode press (setup).
2. Press (▲) / (▼) to scroll through the setup menu until gEn is displayed on the top line.
3. Press (menu) to accept selection and move the arrow icon to the middle line.
4. Press (▲) / (▼) to scroll through:
   a. dEgC = Manual Temperature Setting
   b. St Ir = Enable and Set Stirrer Speed
   c. AUtO = Auto-Shut Off enable/disable
5. Press (menu) to accept the selection and move the arrow icon to the bottom line.
   a. Press (▲) / (▼) to identify and (edit) to edit next value.
   b. Press (menu) to accept the selection and move the arrow icon to the top line.
6. Press (measure) to return to the measurement mode.

## Time and Date Setup

The following table describes in greater detail the abbreviations shown on the display screen.

| Description | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| Time: Hour Setting | dAtE<br>HOUr<br>HH12 | **00 - 23**<br>Sets the hour of the current time in 24 hour format | **12** | No |
| Time: Minute Setting | dAtE<br>tInE<br>mm12 | **00 - 59**<br>Sets the minutes for the current time | **00** | No |
| Date Format | dAtE<br>tYPE<br>dmY | **mdY, dmY**<br>Month, day, year or day, month, year display format | **mdY** | No |
| Date: Year Setting | dAtE<br>YEAr<br>2004 | **00 - 99**<br>Sets the year for the current date from 2000 to 2099 | **04** | No |
| Date: Month Setting | dAtE<br>dAtE<br>mm01 | **01 - 12**<br>Month setting 01 (January) through 12 (December) | **01** | No |
| Date: Day of the Month Setting | dAtE<br>dAY<br>dd01 | **01 - 31**<br>Day of the month | **01** | No |






1. In the measurement mode press (setup).
2. Press (△) / (▽) to scroll through the setup menu until dAtE is displayed on the top line.
3. Press (menu) to confirm setting and move the arrow icon to the middle line.
4. Press (△) / (▽) to scroll through:
   a. HOUr = Current Hour
   b. t InE = Current Minute
   c. tYPE = Format the date stamp as either "mdY" (month, day, year) or "dmY" (day, month, year)
   d. dAtE = Current Month (Use numeric equivalents for months of the year)
   e. dAY = Current Day of the Month
   f. YEAr = Current Year
5. Press (menu) to accept selection and move the arrow icon to the bottom line.
6. Press (△) / (▽) and (edit) to edit the selected value.
7. Press (menu) to accept the selection and move the arrow icon to the top line.
8. Repeat steps 3-7 to edit time and date settings as needed.
9. Press (↩) to return to the measurement mode.

## Continuous, Timed, or AUTO-READ™ Measurement Selection

The following table describes in greater detail the abbreviations shown on the display screen.

| Description | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| Continuous, Timed, or AUTO-READ Measurement Selection | rEAd tYPE COnt | **COnt, AUtO, tImE** Timed, continuous, or AUTO-READ; automatically prints and logs in AUTO-READ and timed modes | **AUtO** | Yes |
| Timed Reading Setting | rEAd tInE 00:00 | **00:05 - 99:61** Timed readings in minutes and seconds | **01:00** | Yes |

To change settings, simply use (☰) and (△) / (▽) to move between options. Pressing (☰) will confirm the change of a value and end the flashing display.

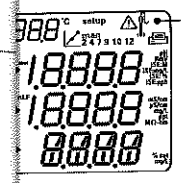
The sympHony meters allow you to select your preferred timing for measurement intervals.


- In continuous mode the instrument is constantly making measurements and updating the screen. To print and log the measurement in this mode press (🌡).
- In timed mode the instrument is constantly making measurements, updating the display, and will automatically log and print data at a pre-selected time interval.
  - In the setup menu enter the minutes and seconds between timed readings by pressing (△) / (▽) to change the value of the flashing digit. Press (⏱) to change the digit to be scrolled.
  - The minimum time interval is 5 seconds. Acceptable time ranges are: 00:05 - 99:59





- In AUTO-READ mode the instrument starts a measurement whenever (🌡) is pressed. Once the reading becomes stable, the display freezes while data is automatically logged and printed.
  - The AUTO-READ mode will also automatically operate the **Stirrer Control**. It will stop stirring when the reading becomes stable. To set the stirrer speed, press (🔧). Use (△) / (▽) to select:


AR AUTO-READ

## Selecting Measurement Mode

In the measurement mode the arrow icon on the left side of the display screen indicates which mode is selected. Use △ / ▽ to scroll through the various modes associated with a selected line. Use ☰ to move the arrow icon to the next line, and then toggle △ / ▽ to scroll through the modes associated with the selected line.

pH ISE ▶
- **pH**
- **mV**
- **Rel mV**
- **ISE**
- Off

Cond ▶
- **µS/cm** or **mS/cm** for conductivity
- **mg/L** for TDS
- **ppt** for Salinity
- **MΩ-cm** for resistivity
- Off

DO ▶
- **%Sat** for DO percent saturation
- **mg/L** for DO concentration
- Barometric Pressure
- Off

For setup information related to specific techniques, refer to **Chapter VI** through **Chapter IX** of this manual.





## etting Calibration

e ⟋ indicates calibration mode or calibration setup.

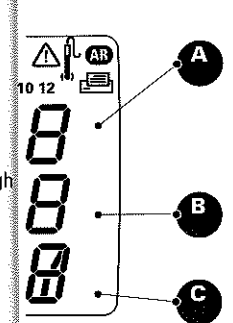
efore beginning a calibration, prepare the electrode or probe according to the structions received with the electrode or probe. The calibration standards, buffers, calibration sleeve should also be prepared prior to the calibration. After preparing e electrode or probe per manufacturer's instructions, connect the electrode or be to the meter. Basic information on proper calibration for each measurement hnique is found in the appropriate section of this manual.

### neral Navigation for Selecting Calibration

In measurement mode press ☰ until the arrow icon on the left of the screen is pointed toward the measurement mode to the calibrated:

**pH, ORP, ISE • Conductivity • DO**

Press △ / ▽ until the appropriate icon is lit for the measurement mode to be calibrated.




pH
RmV
ISE:M
ISE:mg/L
ISE:%
ISE:ppb

– **pH/ORP/ISE**

pH icon – pH Calibration
RmV icon – ORP Calibration
ISE icon or no icon – ISE Calibration

mS/cm
µS/cm
mg/L
ppt
MΩ-cm

– **Conductivity Calibration**

mS/cm, µS/cm, mg/L, ppt or MΩ-cm icon

% sat
mg/L

– **DO Calibration**

% sat or mg/L icon – DO Calibration
No icon – Barometer Calibration

Then press ⟋ to begin the selected calibration.

## NOTES

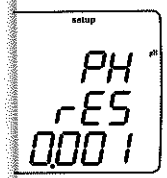


# hapter VI
# H Technique

## H Setup

e following table describes pH setup.

| escription | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| H Resolution | PH<br>rES<br>0.01 | **0.1, 0.01, 0.001** | **0.01** | Yes |
| H Buffer Set | PH<br>bUF<br>USA | **USA** (USA Buffers)<br>1.68, 4.01, 7.00, 10.01, 12.46<br>**EUrO** (Euro Buffers)<br>1.68, 4.01, 6.86, 9.18 | **USA** | Yes |




1. In the measurement mode press (setup).
2. Press (△) / (▽) to scroll through the setup menu until PH is displayed on the top line.
3. Press (menu) to confirm setting and move the arrow icon to the middle line.
4. Press (△) / (▽) to select rES for resolution.
5. Press (menu) to select option and move the arrow icon to the bottom line.
   a. Use (△) / (▽) to set the desired resolution.

6. Press (☰) to accept the selection and move the arrow icon to the top line.

7. Press (☰) to move to middle line and press (△) / (▽) to select bUF for Auto-Buffer-Recognition setting and press (☰) again to move to the bottom line.

8. Press (△) / (▽) to select either USA or EUr0; press (☰) to accept the selection.

9. Press (🌡) to return to measurement mode.





## H Calibration

Prepare the electrode for use according to the instructions received with the electrode.

In setup mode select the buffer set of NIST (USA) or DIN (EUr0) being used for the proper buffer recognition to occur, if not set previously.

Press (☰) until the arrow icon is pointing to the pH measurement line.

Press (↙).

Rinse the electrode and ATC probe and place into the buffer.

Wait for the **pH** to stop flashing.

a. Auto-Buffer-Recognition – When the **pH** stops flashing the meter will display the temperature-corrected pH value for the buffer.

b. Manual Calibration – When the **pH** stops flashing the meter will display the actual buffer value read by the pH electrode. Use the (✱) and (△) / (▽) to change the pH value to the temperature-corrected pH value for the buffer.

Once the correct buffer value is shown on the meter display, press (↙) to proceed to the next calibration point and repeat steps 5 through 6 or press (🌡) to save the calibration.

The slope will be displayed before the meter returns to the measurement mode. SLP is displayed in the lower field and the actual electrode slope, in percent, is displayed in the main field.

a. On a 1 point calibration use the (✱) and (△) / (▽) to edit the slope then press (🌡) to return to the measurement mode.

b. On the 2 or more point calibration the meter will automatically go to the measurement mode 2 seconds after display of SLP.

## pH Measurement

1. Rinse the electrode in deionized water. Shake off any excess water and blot d with lint-free tissue.

2. Place the electrode in your sample.

   a. If you are in continuous measurement mode, the instrument will start measuring immediately. If you are using the benchtop meter and the stir control is disabled, then pressing (STIR) will start the stirrer. The **pH** will fl until the reading is stable. Once the reading is stable you can log and pri the measurement by pressing (LOG). If the stirrer is on, press (STIR) to turn the stirrer before removing the stirrer from the sample.

   b. If you are in AUTO-READ™ mode then press (LOG) to start the measureme Once the reading is stable the meter will automatically log and print the results and freeze the display. If the stirrer is enabled then the stirrer wil turn on when (LOG) is pressed and turn off once the reading has stabilized.

   c. If you are in timed measurement mode then the meter will start making measurements at the frequency you have specified during setup. It will automatically log and print each measurement. If you are using the benchtop meter and the stirrer control is enabled, then pressing (STIR) wil start the stirrer. Pressing (STIR) again will turn off the stirrer.

3. Remove the electrode from the sample and rinse with deionized water, shak blot dry, then place it in your next sample and repeat step 2.

4. Once you are finished measuring samples, rinse the electrode with deionized water and blot dry. Then consult your electrode manual for proper electrode storage instructions.



# hapter VII
# issolved Oxygen Technique

## issolved Oxygen Setup

e following table describes dissolved oxygen setup.

| escription | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| ssolved Oxygen Saturation Resolution | dO<br>rES<br>0.1 | **1, 0.1**<br>DO % saturation resolution | **0.1** | Yes |
| ssolved Oxygen ncentration Resolution | dO<br>rES<br>0.01 | **0.1, 0.01**<br>DO concentration "mg/L" resolution | **0.01** | Yes |
| ssolved Oxygen rometric Pressure mpensation Selection | dO<br>bAr<br>AUtO | **AUtO, mAn**<br>Selects internal barometer or manual pressure | **AUtO** | Yes |
| ssolved Oxygen Manual rometric Pressure tting | dO<br>PrES<br>760.0 | **450.0 - 850.0**<br>Manual pressure compensation value | **760.0** | Yes |
| ssolved Oxygen Salinity rrection Selection | dO<br>SAL<br>AUtO | **AUtO, mAn**<br>Selects method of salinity correction; meters with conductivity function only | **AUtO** | Yes |
| ssolved Oxygen Manual linity Correction Factor | dO<br>SALF<br>0 | **0 - 45**<br>Manual salinity correction factor | **0** | Yes |
| ssolved Oxygen libration Type Selection | dO<br>CALt<br>Air | **Air, H2O, mAn, SEt0**<br>Air = Water sat. air<br>H2O = Air sat. water<br>mAn = Manual<br>SEt0 = Zero point | **Air** | Yes |

## DO Setup Steps

1. From the measurement mode, press (⚙).
2. Press (△) / (▽) to scroll through the setup menu until dO is displayed on th top line.
3. Press (☰) to confirm the setting and move the arrow icon to the middle line.
4. Press (△) / (▽) to scroll through:
   a. rES + % Sat = % Saturation Resolution
   b. rES + mg/L = Concentration Resolution
   c. bAr = Barometer Type (Auto/Manual)
   d. PrES = Manual Pressure Compensation
   e. SAL = Automatic/Manual Salinity Compensation
   f. SALF = Manual Salinity Correction
   g. CALt = Calibration Type
5. Press (☰) to select the option and move the arrow icon to the bottom line.
6. Press (△) / (▽) and (✱) to enter the value. The previous table identifies wh you will see on the display and the range of values which may be entered.
7. After entering a value, press (☰) to complete programming of that option an move the arrow icon to the top line. Repeat steps 3 through 6 for all options.
8. Press (↑) to return to measurement mode.





## ) Calibration

r to calibration, the probe must be prepared and polarized.

The DO probe is continuously polarized when connected to the meter. When first connected, or if more than 60 minutes has elapsed with the probe disconnected, re-connect the probe and allow 30 to 60 minutes for polarization. If the probe readings are stable, probe disconnections of less than one hour will require 5 to 25 minutes for polarization.

***Note:*** *The sympHony meters will supply a polarization current to the DO probe even with the power off. To maximize battery life in the meter, unplug the DO probe if it will not be used for an extended period.* ▲

Zeroing the probe – a DO probe can generate a 0.02 to 0.05 mg/L positive error in an oxygen free (anoxic) solution. If this error is unacceptable, then zero the probe when using a new sensing membrane, using fresh filling solution, or when measuring dissolved oxygen below 1 mg/L or 10% saturation.

air calibration should be done prior to the zero calibration.

In the measurement mode press (⚙).

Press (△) / (▽) until dO is shown on the top line.

Press (☰) to confirm the setting and move the arrow to the middle line.

Press (△) / (▽) to scroll to CALt.

Press (☰) to select setting and move arrow icon to the bottom line.

Press (△) / (▽) to select one of the following calibration modes.

a. A Ir denotes calibration performed in water saturated air using the air calibration sleeve. This is the simplest and most accurate calibration method.

It is also the meter's default setting. If the calibration selection in (⚙) has not been changed, then pressing (↙) will automatically perform an air calibration. Due to the inherent differences between water-saturated air and air-saturated water, upon stability, the air standard is set to 102.3% saturation.

i. The highest possible accuracy is reached when calibration temperature is the same as the measuring temperature.

ii. Moisten the sponge or absorbent cloth in the calibration sleeve with distilled water and insert the probe into the sleeve, but without touching the water saturated material. For BOD measurements, this calibration can be performed in a BOD bottle.

iii. For oxygen levels below 1 mg/L, a zero calibration point is often required.

b. H2O denotes calibration performed using a water sample that is 100% saturated with air. It is the least commonly used calibration method.

c. mAn denotes manual calibration using a water sample with a known concentration of dissolved oxygen. It can be used to calibrate the sensor to the value achieved by a Winkler titration.

i. A Winkler calibration involves performing a manual Winkler titration and then using that sample as a standard. The titration oxygen level result is entered in a Winkler calibration as the DO standard value. This correlates the meter input to the Winkler titration. Note, this method is inherently less accurate due to the possibility of titration errors introduced when the calibration is set to the titration test results.

d. SEtO denotes a zero calibration, which is used for very low level DO measurements. It is not generally required unless you are making measurements below 5% Saturation or 0.5 mg/L.





7. Press (☰) to accept selection and return the arrow icon to the top line.

8. Press (🌡) to return to measurement mode.

9. The probe and calibration standard (water-saturated air or air-saturated water) should be allowed to reach equilibrium before the system is calibrated.

   a. Press (↙).

   b. Wait for reading to stabilize.

   c. Meter will display 102.3% and return to measurement mode.

## DO Measurement

1. Rinse the DO probe, as well as stirrer if being used, in deionized water. Blot dry with a lint-free tissue.

2. Place the DO probe in your sample.

   a. If you are in continuous measurement mode, the instrument will start measuring immediately. If you are using the benchtop meter and the stirrer control is enabled, then pressing (⊟) will start the stirrer.

   The 🌡 will flash until the reading is stable. Once the reading is stable you can log and print the measurement by pressing (🌡). If you are recording the data into a notebook, record the DO as well as the temperature at which the DO reading is taken. If the stirrer is in motion, press (⊟) to turn off the stirrer before removing the stirrer from the sample.

b. If you are in AUTO-READ™ mode then press (↑) to start the measurement. Once the reading is stable the meter will automatically log and print the results and freeze the display. If the stirrer is enabled, then the stirrer will turn on when (↑) is pressed and turn off once the reading has stabilized.

When using the AUTO-STIR™ BOD probe, pressing the button on the probe will start the AUTO-READ measurement.

c. If you are in timed measurement mode then the meter will start making measurements as soon as it goes into measurement mode at the frequency selected in setup. It will automatically log and print each measurement. If you are using the benchtop meter and the stirrer control is enabled then pressing (⊟) will start the stirrer. Pressing (⊟) again will turn off the stirrer.

3. Remove the DO probe from the sample and rinse with deionized water, then place it in your next sample and repeat step 2.

4. When all samples have been measured, rinse the DO probe with deionized water and blot dry. Consult your DO probe manual for proper electrode storage instructions.



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# Chapter VIII
# Conductivity Technique

## Conductivity Setup

| Description | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| Conductivity Temperature Compensation Selection | COnd<br>tC<br>LIn | **OFF, LIn, nLF**<br>Selects temp comp off, linear, or non-linear for natural or ultra-pure water | **LIn** | Yes |
| Conductivity Linear Temperature Compensation Coefficient Setting | COnd<br>COEF<br>2.1 | **0.0 - 10.0**<br>Linear temp compensation coefficient in %/C | **2.1** | Yes |
| Conductivity TDS Factor Setting | COnd<br>tdSF<br>0.49 | **0.00 - 10.0**<br>TDS factor | **0.49** | Yes |
| Conductivity Auto-Calibration Default Cell Constant Setting | COnd<br>CELL<br>0.475 | **0.001 - 199.0**<br>Cell constant used for conductivity AutoCal | **0.475** | Yes |
| Conductivity Temperature Reference Selection | COnd<br>trEF<br>25 | **15, 20, 25**<br>Conductivity reference temperature in °C | **25** | Yes |
| Conductivity Cell Type & Manual Ranging Selection | COnd<br>tYPE<br>Std | **PLnr, Std, 1, 2, 3, 4, 5, 6, 7**<br>Standard, planar cond cell, or sets manual range 1-7 | **Std** | Yes |

1. In the measurement mode press (⚙).
2. Press (△) / (▽) to scroll through the setup menu until COnd is displayed on the top line.
3. Press (⊟) to accept the selection and move the arrow icon to the middle line.

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4. Press △ / ▽ to scroll through the following conductivity settings:
   - tC = Temperature Compensation Selection. The users may elect to turn temperature compensation OFF, select linear L In temperature compensation, or a non-linear nLF temperature compensation for natural and ultra-pure water.
   - COEF = Temperature coefficient for L In (linear) temp compensation expressed in % /C.
   - tdSF = TDS Factor for Total Dissolved Solids measurement
   - CELL = Conductivity Cell Constant (nominal cell constant used for Auto-Calibration)
   - trEF = Reference temperature for temperature compensation. Options are 15 degrees C, 20 degrees C, or 25 degrees C.
   - tYPE = Conductivity cell type (Planar or Conventional)
5. Press ☰ to accept the selection and move the arrow icon to the bottom line.
6. Press △ / ▽ and ⚙ to edit value.
7. Press ☰ to accept the selection and move the arrow to the top line.
8. Repeat steps 3-7 to edit conductivity settings as needed.
9. Press ⏻ to return to measurement mode.





## Conductivity Calibration

1. Prepare the probe for use according to the probe user's guide or operator's manual.
2. In the measurement mode press ☰ until the arrow icon is pointing to the conductivity measurement line.
3. Press ↙.
4. Rinse the probe and place into the conductivity standard.
5. To perform a manual calibration – The screen will display the cell constant on the bottom line and the conductivity value on the middle line. Use ⚙ and △ / ▽ to change the cell constant until the displayed conductivity value matches the conductivity of the conductivity standard at the measured temperature.
   - If you do not start changing the cell constant within 5 seconds the meter will automatically proceed to the AutoCal™/DirectCal™ screen.
6. To perform an AutoCal or DirectCal calibration – Wait for the **µS/cm** or **mS/cm** icon to stop flashing.
   - AutoCal – When the **µS/cm** or **mS/cm** icon stops flashing the meter will display the temperature corrected value of the conductivity standard.
   - DirectCal – When the **µS/cm** or **mS/cm** icon stops flashing the meter will display the actual conductivity value read by the conductivity probe. Use ⚙ and △ / ▽ to change the conductivity value to the actual value of the conductivity standard at the measured temperature.

7. Press (↙) to proceed to the next calibration point and repeat steps 4 through 6 or press (↵) to save and end the calibration.

8. After the value for the last standard has been entered the cell constant will be displayed. CELL appears in the lower field and the actual CELL constant appears in the main field. The meter will automatically advance to the measurement mode. The ↵ is displayed above the main field.





## Conductivity Measurement

1. Rinse conductivity probe and place into sample. Record conductivity directly from the main meter display when the **mS/cm** or **µS/cm** icon stops flashing indicating a stable value. Temperature is displayed in the top left corner of the display.

2a. If you are in continuous measurement mode, the instrument will start measuring immediately. If you are using the benchtop meter and the stirrer control is enabled then pressing (⊟) will start the stirrer.

The ↵ will flash until the reading is stable. Once the reading is stable you can log and print the measurement by pressing the (↵). If you are recording the data into a notebook, record the conductivity as well as the temperature at which the conductivity reading is taken. If the stirrer is in motion, press (⊟) to turn off the stirrer before removing the stirrer from the sample.

2b. If you are in AUTO-READ™ mode then press (↵) to start the measurement. Once the reading is stable the meter will automatically log and print the results and freeze the display. If the stirrer is enabled, then the stirrer will turn on when (↵) is pressed and turn off once the reading has stabilized.

2c. If you are in timed measurement mode then the meter will start making measurements as soon as it goes into measurement mode at the frequency selected in setup. It will automatically log and print each measurement. If you are using the benchtop meter and the stirrer control is enabled then pressing (⊟) will start the stirrer. Pressing (⊟) again will turn off the stirrer.

3. Remove the conductivity probe from the sample and rinse with deionized water, then place it in your next sample and repeat step 2.

4. When all samples have been measured, rinse the conductivity probe with deionized water and blot dry. Consult your conductivity probe manual for proper storage instructions.



# Chapter IX
# ISE Technique

## ISE Setup

| Description | Display | Range of Values | Default Value | Method Specific |
|---|---|---|---|---|
| ISE Resolution | ISE<br>rES<br>1 | **1, 2, 3**<br>ISE resolution in significant digits | **1** | Yes |
| ISE Units | ISE<br>Unit<br>PPb | **M, mG/L, PEr, PPb, nOnE**<br>ISE units displayed | **PPb** | Yes |
| ISE Calibration Standard Concentration Range | ISE<br>rAng<br>HIgH | **LOw, HIgH**<br>Stability criteria used during ISE calibration | **HIgH** | Yes |
| ISE Auto-Blank Correction | ISE<br>nLIn<br>AUtO | **AUtO, OFF**<br>Enables or disables calibration auto-blank | **AUtO** | Yes |

1. In the measurement mode press (setup).

2. Press (△) / (▽) to scroll through the setup menu until *ISE* is displayed on the top line.

3. Press (menu) to accept the selection and move to the middle line.

4. Press ▲ / ▼ to scroll through the following options:

   - rES = Resolution
   - Un It = ISE Measurement units
     - **M** = Molar
     - **mG/L** = mg/L
     - **PEr** = Percent
     - **PPb** = Parts per billion
     - **nOnE** = No units
   - rAnG = ISE calibration range
     - **HIgH** - for most measurements
     - **LOw** - for low level measurements that need more stabilization time
   - nL In = Non-linear Blank Correction
     - **OFF**
     - **AUtO**

5. Press MODE to accept the selection and move the arrow icon to the bottom line.

6. Press ▲ / ▼ and EDIT to edit the selected value.

7. Press MODE to accept the selection and return the arrow icon to the top line.

8. Repeat steps 3 through 7 to edit ISE settings as needed.

9. Press ↑ to return to measurement mode.





## Preparation of Standards

The standards should be prepared in the same ISE units as required by the sample results. It is preferable to use serial dilutions with volumetric glassware to obtain the different concentration levels.

> ***Note:*** *Any reagents such as ionic strength adjustors, should be added to samples and standards as specified in the electrode user's guide or instruction manual.* ▲

The calibration points should bracket the expected concentration range of the samples and there should be a tenfold change in concentration (i.e. 1 ppm and 10 ppm or 10 ppm and 100 ppm).

Fresh aliquots of standard should be used at each calibration.

## ISE Calibration

1. Prepare the electrode and standards for use according to the electrode user's guide or instruction manual.

2. Press (☰) until the arrow icon is pointing to the **ISE** measurement line.

3. Press (↙).

4. Rinse the electrode, shake any excess deionized water off and blot dry, and place into the least concentrated standard.

5. Wait for **ISE** to stop flashing. Press (△) / (▽) and (⚙) to change the value of the standard.

6. Press (↙) to proceed to the next lowest calibration standard and repeat steps 4-5, working from lowest concentration to highest, or press (🌡) to save the calibration.

7. The slope will be displayed before the meter returns to the measurement mode. SLP is displayed in the lower field and the actual electrode slope, in **mV**, is displayed in the main field.

   ***Note:*** For a 2 or more point calibration the meter will automatically proceed to measurement mode after 3 seconds. For a 1 point calibration the meter will allow you to edit the slope then proceed to measurement mode. ▲

   ***Note:*** *If editing a negative number for slope:* ▲

   ***a.*** *Press (⚙) until no digit is blinking and the arrow icon is blinking.*

   ***b.*** *Press (△) / (▽) to change the sign of the slope.*

   ***c.*** *Press (🌡) to save.*





## ISE Measurement

After calibrating the electrode the meter is ready to start taking measurements. Make sure that the instrument is in measurement mode ( 🌡 is lit) and that the **ISE** is lit. If the 🌡 is not lit press (🌡) to return to measurement mode. If the **ISE** is not lit, press (☰) until the arrow on the left of the display is pointing at the top line. Then press (△) until the **ISE** lights. You are now ready to start measuring.

1. Rinse the electrode in deionized water. Shake off any excess water and blot dry with lint-free tissue.

2. Place the electrode in your sample.

   a. If you are in continuous measurement mode, the instrument will start measuring immediately. If you are using the benchtop meter and the stirrer control is disabled, then pressing (▤) will start the stirrer. The **ISE** will flash until the reading is stable. Once the reading is stable you can log and print the measurement by pressing (🌡). If the stirrer is on, press (▤) to turn off the stirrer before removing the stirrer from the sample.

   b. If you are in AUTO-READ™ mode then press (🌡) to start the measurement. Once the reading is stable the meter will automatically log and print the results and freeze the display. If the stirrer is enabled then the stirrer will turn on when (🌡) is pressed and turn off once the reading has stabilized.

   c. If you are in timed measurement mode then the meter will start making measurements at the frequency you have specified during setup. It will automatically log and print each measurement. If you are using the benchtop meter and the stirrer control is enabled, then pressing (▤) will start the stirrer. Pressing (▤) again will turn off the stirrer.

3. Remove the electrode from the sample and rinse with deionized water, shake or blot dry, then place it in your next sample and repeat step 2.

4. Once you are finished measuring samples, rinse the electrode with deionized water and blot dry. Then consult your electrode manual for proper electrode storage instructions.



# Chapter X
# Declaration of Conformity

**Address:** 166 Cummings Center
Beverly, MA 01915
USA

We declare that the following products described below conform to the Directive and Standard listed below:

**Product(s):** Meters for Measuring pH, Conductivity, Dissolved Oxygen, and/or ISE
Benchtop models are rated 100-240 VAC, 50/60 Hz, 0.5 A
Handheld models use 4 non-rechargeable AA Batteries

| Benchtop | Portable |
|---|---|
| SB70P benchtop | SP70P portable |
| SB70D benchtop | SP70D portable |
| SB70C benchtop | SP70C portable |
| SB80PI benchtop | SP80PI portable |
| SB80PD benchtop | SP80PD portable |
| SB80PC benchtop | SP80PC portable |
| SB90M5 benchtop | SP90M5 portable |

**Equipment Class:** Measurement, control and laboratory
Benchtop models are EMC Class A
Portable models are EMC Class D

**Directive(s) and Standard(s):**

- 89/336/EEC – Electromagnetic Compatibility (EMC Directive)
  - EN 61326:1997 + A1:1998 + A2:2001 – Electrical equipment for measurement, control, and laboratory use – EMC requirements
- 73/23/EEC – Low Voltage Directive (LVD)
  - EN 61010-1:2001 – Safety requirements for electrical equipment for measurement, control, and laboratory use – general requirements

Manufacturer's Authorized Representative: Date:

Patrick Chiu
Sr. QA Engineering, Regulatory Compliance

June 6, 2007

## WEEE Compliance:

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC . It is marked with the following symbol:

Thermo Scientific has contracted with one or more recycling/disposal companies in each EU Member State and this product should be disposed of or recycled through them. Further information on compliance with these Directives, the recyclers in your country, and information on Thermo Scientific Orion products which may assist the detection of substances subject to the RoHS Directive are available at www.thermo.com/WEEERoHS.